

Microchannel Methanation Reactors Using Nanofabricated Catalysts, Phase I

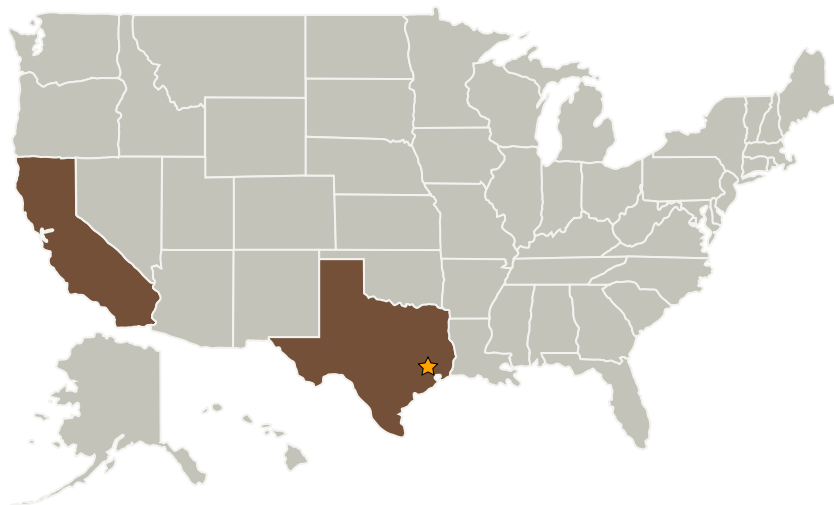
Completed Technology Project (2009 - 2009)



Project Introduction

Makel Engineering, Inc. (MEI) and the Pennsylvania State University (Penn State) propose to develop and demonstrate a microchannel methanation reactor based on nanofabricated catalysts. Sustainable/affordable exploration of space exploration will require minimization of re-supply from Earth by implementation of In-Situ Resources Utilization (ISRU) strategies. For exploration of the Moon, one of the most significant resources is the lunar regolith, which is a complex mix of minerals with large oxygen content in their composition. Oxygen finds its main uses as a propellant, and for life support systems. There are currently many technologies being developed addressing the production of oxygen from lunar regolith, including carbothermal processes. The key to sustainability is to make sure any consumables carried from Earth are recycled to the maximum extent possible, minimizing the need of re-supply. In the case of carbothermal based oxygen production, carbon oxides must be converted to methane for reintroduction in the carbothermal system. This proposed program specifically addresses topic X3.02 Oxygen Production from Lunar Regolith, by developing a methanation system that will efficiently convert mixed carbon oxides and hydrogen to methane and water.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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| Organizations Performing Work | Role | Type | Location |
|-------------------------------|-------------------------|--|-------------------|
| ★ Johnson Space Center(JSC) | Lead Organization | NASA Center | Houston, Texas |
| Makel Engineering, Inc. | Supporting Organization | Industry Small Disadvantaged Business (SDB) | Chico, California |

Primary U.S. Work Locations

| | |
|------------|-------|
| California | Texas |
|------------|-------|

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX07 Exploration Destination Systems
 - └ TX07.2 Mission Infrastructure, Sustainability, and Supportability
 - └ TX07.2.1 Logistics Management